United States Patent [19]

Versteeg

[11] **Patent Number: 4,487,483**

[45] **Date of Patent: Dec. 11, 1984**

[54] **CATADIOPTRIC OBJECTIVE**

[75] Inventor: **Frits J. Versteeg**, Rotterdam, Netherlands

[73] Assignee: **N.V. Optische Industria "De Oude Delft"**, Delft, Netherlands

[21] Appl. No.: **448,198**

[22] Filed: **Dec. 9, 1982**

[30] **Foreign Application Priority Data**

Dec. 22, 1981 [NL] Netherlands 8105795

[51] **Int. Cl.**[3] **G02B 17/08**

[52] **U.S. Cl.** **350/444**

[58] **Field of Search** 350/444

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,273,425 6/1981 Canzek 350/444

Primary Examiner—John K. Corbin
Assistant Examiner—Rebecca D. Gass
Attorney, Agent, or Firm—Louis E. Marn

[57] **ABSTRACT**

The invention relates to a compact, high-aperture, catadioptric objective. Such an objective comprises a negative lens, a main mirror disposed on the peripheral area of a surface of this lens, a positive front lens, a counter mirror facing the main mirror and disposed on the central area of a surface of the front lens, and a field lens adjacent to the negative lens.

It is an object of the invention to provide a light-weight, low-cost structure for an objective of the above kind, without detoriating the advantageous optical characteristics. This object is achieved by disposing the field lens in spaced relation to the negative lens, while dimensioning the composite objective in such a manner that

$$-0.4 < \frac{n_2 - 1}{r_3} + \frac{1 - n_3}{r_8} < -0.05$$

and

$$1.46 < (n_1, n_2) < 1.70$$

wherein n_1, n_2 and n_3 are the refractive indices of the front lens, the negative lens and the field lens respectively; and r_8 and r_3 are the radii of curvature of the adjacent surfaces of the field lens and the negative lens respectively.

4 Claims, 1 Drawing Figure